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| 09/817,334 | 03/21/2001 | James A. Folta | IL-10725 | 8917 |

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|---|---|
| GLASS, CHRISTOPHER W | |
| ART UNIT | PAPER NUMBER |
| 2878 | |

DATE MAILED: 03/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. 09/817,334 | Applicant(s) FOLTA ET AL. | |
|---|---|---|---|
| | Examiner Christopher W. Glass | Art Unit 2878 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *25 November 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) *1-32* is/are allowed.

6)☒ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments with respect to claims 1-32 have been considered but are moot in view of the new ground(s) of rejection.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1,2,5,6,9-11,14-17,19, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 3,658,528 to Berman et al. (hereafter Berman).

Regarding claims 1,2, and 21: Berman discloses a method for correcting the figure of a substrate 1 (Figure 1), comprising measuring the figure of a surface of the substrate 1, attaching a figure-correcting layer 7 to a surface of the substrate 1a (Figure 2), locally adjusting the thickness of the figure-correcting layer (through the use of radiation source 2, test apparatus 3, controller 6, and computer 5, Figure 1), and measuring the thickness of the figure-correcting layer 7. As shown by Figure 3, after adjustment, the thickness of correcting layer 7a is changed, due to the polymerization of section 7b forming the desired residual figure. Berman iterates between the steps of locally adjusting the thickness of the figure-correcting layer 7 and measuring the thickness of the figure-correcting layer 7 until a desired figure is obtained (see Column 2, lines 7-38 and 54-58). The figure of the surface is measured prior to the step of applying a figure-correcting layer (see Column 2, lines 11-17).

Regarding claims 5 and 11: In Berman, the step of measuring the figure of the substrate 1 is carried out with a phase shifting diffraction interferometer (see Column 2, lines 18-24).

Regarding claims 6 and 15: The thickness of the figure-correcting layer 7 of Berman is known, and the step of locally adjusting the thickness of the figure-correcting layer comprises adding material to the figure-adjusting layer 7 (see Figure 3 and Column 4, lines 52-68).

Regarding claims 9 and 10: In Berman, the step of locally adjusting the thickness of the figure-correcting layer 7 is carried out with an electromagnetic beam (from source 2), comprising light in any of the visible light, ultraviolet light, infrared light, and x-ray light ranges (see Column 2, lines 7-10, 39-41, and 59-64).

Regarding claim 14: In Berman, the thickness of the figure-correcting layer 7 is compared to the figure of the surface of the substrate 1 to determine the figure of the substrate in combination with the figure-correcting layer 7 (see Column 2, lines 23-37).

Regarding claim 16: The step of locally adjusting the thickness of the figure-correcting layer 7 of Berman comprises removing material from the figure-adjusting layer (see Column 2, lines 54-58).

Regarding claim 17: In the process disclosed by Berman, the step of locally adjusting the thickness of the figure-correcting layer 7 comprises adding and removing material to and from the figure-correcting layer 7. As shown by Figures 2 and 3, a chemically altered portion is created from the interface of layers 1a and 7, which effectively changes the thickness of both layers, and following this step, unwanted sections 7a are removed.

Regarding claim 19: The step of measuring the thickness of the figure-correcting layer is carried out at a plurality of points simultaneously (see Berman, Column 2, lines 17-37).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 3,7,18,20, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berman.

Regarding claims 3 and 7: Berman does not specifically disclose the exact index of refraction of the figure-correcting layer **7**, and therefore this layer is not expressly taught as being nearly the same as or different from the index of refraction of the substrate **1**. However, it would have been obvious to use a material having an index of refraction that is conducive to allowing radiation from source **2** to chemically alter (see Column 1, lines 30-40) desired portions of the interface section of layer **7**, thereby adjusting the figure of substrate **1**. Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding claim 18: Berman does not specifically teach employing a polishing tool in the step of locally adjusting the thickness of the figure-correcting layer. However, utilizing polishing tools and mechanical pressure is well known in the art (see Column 1, lines 4-23), and it would have been obvious to one having ordinary skill in the art to use a polishing tool or other means of expediting and supplementing the dissolving/removal of unwanted portions (**7a**) of the

figure-correcting layer **7**, such that the resulting optical means has a flaw-free surface and ideal figure.

Regarding claim 20: In the disclosure of Berman, "an interference picture **4** of the surface is obtained which indicates the surface asymmetries and irregularities on the blank **1**" (Column 2, lines 20-23). While the use of a two-dimensional detector is not expressly stated, it would have been obvious to one having ordinary skill in the art to use a two-dimensional detector, such as a CCD camera, to obtain these pictures.

Regarding claim 22: While Berman does not specifically teach measuring the figure of the surface of the substrate **1** after the step of applying a figure-correcting layer is carried out, it would have been obvious to one having ordinary skill in the art to configure test apparatus **3**, in conjunction with computer **5** and controller **6**, to obtain pictures (e.g. interference pictures **4**) for measurement, after applying the figure-correcting layer and/or after adjusting the thickness of the layer and removing the unwanted sections to ensure that the application of the layer was successfully done and to make certain that (after removal of the unwanted portions) figure adjustment has been made and that the optical component is ideally shaped and free of surface flaws.

6. Claims 4,8, and 23-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berman, in view of U.S. Patent No. 2,399,799 to Geullich.

Regarding claims 4 and 23: Berman discloses a method for correcting the figure of a substrate **1** (Figure 1), comprising measuring the figure of a surface of the substrate **1**, attaching a figure-correcting layer **7** to a surface of the substrate **1a** (Figure 2), locally adjusting the thickness of the figure-correcting layer (through the use of radiation source **2**, test apparatus **3**,

controller 6, and computer 5, Figure 1), and measuring the thickness of the figure-correcting layer 7. In the disclosure of Berman, an interface is inherently created where the substrate layer 1a and figure-correcting layer 7 meet (see Column 2, lines 52-53). Therefore, the figure-correcting layer 7 is attached to this interface, but Berman does not specifically teach the use of a separate interface layer or marker layer, attached to a surface of the substrate 1a, and wherein the figure-correcting layer 7 is attached to this interface/marker layer. However, it is well known in the art to provide such a configuration. Geullich shows in Figure 3 a process of making optical devices which comprises providing a figure-correcting layer 3 on top of an interface layer 2, the interface layer being attached to the optical substrate 1. The interface layer 2 can consist of multiple layers itself (see Column 2, lines 16-20); when the figure-correcting layer is exposed to light, the desired insoluble figure section is left on top of the substrate 1, and unwanted portions of this layer can then be dissolved away (see Column 2, lines 34-53). It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide an interface/marker layer between the substrate 1a and figure-correcting layer 7 of Berman, since this is well-known in the art, and to aid in the adhesion and formation of the figure-correcting layers to yield an ideal shape of the substrate for accurate optical performance of the finished component.

Regarding claim 8: The figure-correcting layer 7 of Berman is not expressly taught as comprising an optical material having embedded material selected from the group consisting of Al, Cr, Co, Ni, Ti, Mo, and Si. However, it is well known in the art to use silver and copper in these layers, as taught by Guellich (Column 2, lines 7-15). It therefore would have been obvious to utilize one of these materials in the figure-correcting layer 7 of Berman, and further since it

has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding claim 24: The figure of the surface 1 is measured prior to the step of applying a figure-correcting layer (see Column 2, lines 11-17).

Regarding claim 25: The thickness of the figure-correcting layer 7 is measured and known (see Column 4, lines 52-68).

Regarding claim 26: Berman iterates between the steps of locally adjusting the thickness of the figure-correcting layer 7 and measuring the thickness of the figure-correcting layer 7 until a desired figure is obtained (see Column 2, lines 7-38 and 54-58).

Regarding claims 27 and 28: Berman does not specifically disclose the exact index of refraction of the figure-correcting layer 7, and therefore this layer is not expressly taught as being nearly the same as or different from the index of refraction of the substrate 1. However, it would have been obvious to use a material having an index of refraction that is conducive to allowing radiation from source 2 to chemically alter (see Column 1, lines 30-40) desired portions of the interface section of layer 7, thereby adjusting the figure of substrate 1. Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding claim 29: The step of locally adjusting the thickness of the figure-correcting layer 7 is carried out with an electromagnetic beam (from source 2, see Column 2, lines 7-10, 39-41, and 59-64).

Regarding claim 30: The step of measuring the thickness of the figure-correcting layer is carried out with interferometry (see Column 2, lines 17-22).

Regarding claim 31: In Berman, the thickness of the figure-correcting layer **7** is compared to the figure of the surface of the substrate **1** to determine the figure of the substrate in combination with the figure-correcting layer **7** (see Column 2, lines 23-37).

Regarding claim 32: In the process disclosed by Berman, the step of locally adjusting the thickness of the figure-correcting layer **7** comprises adding and removing material to and from the figure-correcting layer **7**. As shown by Figures 2 and 3, a chemically altered portion is created from the interface of layers **1a** and **7**, which effectively changes the thickness of both layers, and following this step, unwanted sections **7a** are removed.

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Berman, in view of U.S. Patent No. 4,482,424 to Katzir et al. (hereafter Katzir). Berman does not specifically teach measuring the thickness of the figure-correcting layer by fluorescence (or by an optical method selected from the group consisting of interferometry, optical reflectance spectroscopy, ultrasound reflectance spectroscopy, and fluorescence measurement). However, it is well known in the art to implement fluorescence measuring for such a purpose. Katzir discloses a method for monitoring etching of resists by monitoring the fluorescence of the unetched material, and shows in Figure 2 a substrate covered by an organic material **18**, doped with fluorescence, disposed beneath a layer of $SiO_2$ **20** and a photoresist layer **22**. "During the reactive ion etching of the $SiO_2$ layer **20**, in the $CHF_3$ plasma, the intensity of the fluorescence emitted by the planarizing layer **18** remains constant. But as soon as the detected fluorescence is first observed to substantially decrease...the etching of the $SiO_2$ layer is halted. Thus, over-etching of the $SiO_2$

layer **20**, and undesirable excessive etching of the upper, high resolution resist layer **22**, is avoided" (Column 4, lines 55-65). It would have been obvious to one having ordinary skill in the art to have used fluorescence to measure the thickness of the figure-correcting layer **7** of Berman. This layer could have been doped with fluorescent material, as could upper layers of the substrate **1**, in order to detect and prevent overstripping of the figure layers.

8. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Berman, in view of U.S. Patent No. 5,814,528 to Ju et al (Ju). Berman does not specifically teach measuring the thickness of the figure-correcting layer through the use of ultrasound. However, it is well known in the art to implement ultrasound in the processing and analysis of substrate figures. Figures 1A and 1B of Ju discloses a conventional configuration of bonded semiconductor substrates. "Methods for observing the non-contact regions of the pair of (such) semiconductor substrates include using an IR image (infrared image), using ultrasound microscopy, using x-ray topography and using a magic mirror" (Column 1, lines 24-27). It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ ultrasound in measuring the thickness of the figure-correcting layer of the disclosure of Berman, in order to monitor thickness of the substrate figure layers "simply and easily" (Ju, Column 1, line 34).

***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher W. Glass whose telephone number is 703-305-1980. The examiner can normally be reached 9:30am-6:00pm, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached at 703-308-4852. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

STEPHONE ALLEN
PRIMARY EXAMINER

cg
February 28, 2003